

APPENDIX B. ON-THE-JOB TRAINING

The wildland firefighting job requires working in proximity to danger, and is inherently risky. However, though they work close to danger, few firefighters have been in critical situations such as having to deploy fire shelters, etc. Therefore, they do not accumulate certain types of important experience first hand. Direct experience takes a long time to accumulate, and carries risks with it. Consequently, the accumulation of experience is likely to be slow because the opportunities to explore the edge of the risk envelope will (hopefully) be limited.

This is why it is important to speed up the learning curve for wildland firefighters. Crew Supervisors must recognize and understand acceptable risk. If Crew Supervisors have too little tolerance for risk, and they withdraw at the slightest sign of danger, they cannot perform their job. In addition, they cannot learn the edges of the risk envelope, because they are not experiencing those edges. However, if Crew Supervisors accept too many risks, they act irresponsibly, putting crews in harm's way unnecessarily.

The agencies try to use rules to help firefighters react effectively to risks. Different lists of rules and danger signs exist now, including LCES, 10 Standard Fire Orders, 18 Watch Outs, Downhill guidelines, etc. However, as has been discussed elsewhere in this report, prescriptive rules do not adequately ensure safety. Each rule is itself a compilation of experience and requires experience in order to know-how to interpret it.

This report presents a number of recommendations for developing training that can speed up the accumulation of experience and hence directly impact the safety of wildland firefighters. Here we discuss a key platform for delivering training to speed up the accumulation of experience, a program for on-the-job training (OJT). This Appendix elaborates on the discussion of On-the-Job Training in Chapter 5, Goal 71, Implementation Strategy 1.

On-the-Job Training – Basic Skills

In most workplaces, on-the-job training (OJT) is the primary way that people learn what they need to know to do their job. Classroom training often lacks realism and does not completely transfer once the trainees are in the workplace. Also, many classroom training practices contradict much of what we know about adult learning: that adults need to see the immediate relevance of what they are learning, they need to be actively engaged in exploring,

they need to build their own mental models, and they learn best when they are initiating the motivation. Often, classroom training disengages the learner from the job context, makes the learner passive (e.g., by forcing groups to sit quietly and listen to lectures), tries to impose the instructor's mental model on the entire class, and substitutes the instructor's motivational skills for the trainees' own motivation. Yet, most of the training budget in business, the military and the agencies sponsoring this study is spent on producing or buying training systems such as professionally-conducted classroom programs, reading materials such as textbooks and pamphlets, or software for computer-assisted instruction.

Organizations sometimes produce procedural manuals or checklists of how to train new trainers. These manuals may include general training guidelines such as: demonstrate, ask questions, allow trainee to practice, and give feedback. This implies the use of OJT. However, very few organizations help the OJT providers develop the skills to deliver effective training. These skills include:

- how and when to use various instructional techniques
- how to diagnose the reason why a trainee “just isn’t getting it”
- how to set reasonable learning goals
- how to re-adjust learning goals so that the trainee is neither bored nor intimidated
- how to notice and change a poor learning climate
- how and when to pass on one’s expertise
- how to be a manager of someone else’s learning
- how to identify the “teachable moment” (with examples appropriate to what happens on a given day).

Most organizations do not train their trainers on specific and practical OJT skills. The net result is that the driver to success — the OJT provider — has been virtually forgotten by the thousands of military and civilian organizations that depend on OJT to train their workforces. In local fire departments, the Captain is responsible for all functions, including training of his or her unit. However, Captains are given little preparation for being trainers. If preparation is offered, it is frequently about classroom types of instruction: how to present the training modules that are continually being developed by the training department. Rarely are the Captains shown how to provide OJT. As a result, the greatest training resource in the station, the expertise of the senior officers, goes untapped.

An Expertise-Centered Approach to OJT

Generally, expertise refers to the skills and the competence that an individual gains from a wide variety of sources. These include classes, workshops, reading, and experience. However, people have to learn a significant portion of their information and skills on-the-job. Firefighters develop many of their perceptual skills by experiencing things first hand. Take for example the ability to determine when the fuel moisture content has dropped to a potentially dangerous level. This is knowledge that can be taught in the classroom through video and other means up to a point, but there is also a subtle knowledge that must be learned experientially.

Another aspect of expertise is the ability to recognize uncertainty. Uncertainty encompasses a variety of factors including ambiguous, missing, and/or contradictory information. It often takes expertise to be able to recognize uncertainty and to be able to deal with it. This is a skill that is not easy to teach in a classroom since it often involves the ability to recognize the absence of something, rather than its presence. The important point to these examples is that expertise is not always easy to communicate via traditional training/learning methods and often must be accumulated first hand, i.e., on-the-job.

An expertise-centered OJT approach requires that expertise exists among a wide body of OJT trainers. Of course expertise does exist in the firefighting community, and in great quantity. We must be realistic and recognize that all similarly certified individuals do not have equal expertise. However, expertise is still present to one degree or another and we have to take advantage of, and leverage whatever amount is present. The agencies need to help people do a better job of passing on whatever expertise they do possess.

OJT can be delivered anywhere along a continuum from unstructured to completely structured. Neither extreme is desirable. Unstructured OJT is typical. People usually are expected to pick up the nuances of their jobs by osmosis, by accident, or just by hanging around more skilled firefighters who have not been taught how to be good mentors. This approach seems to work eventually, and is how many new firefighters learn the difficult parts of their jobs. However, this form of OJT takes a long time, and is inefficient. In addition, unstructured OJT has a big drawback. Improving a trainee's perceptual skills, such as size-up or situational awareness, requires them to notice subtle cues, recognize what you don't know and what information is missing. Unstructured OJT is very unreliable for getting these skills across.

On the other end of the continuum lies highly structured OJT. Here, trainers see the field setting as an extension of the classroom. Trainers carefully prepare learning objectives, design evaluation procedures, and drill OJT providers on ways to get these objectives across. These highly structured methods are helpful for some types of skills. For example, when a new piece of equipment is issued, the firefighters will benefit from training guided by objectives, exercises and evaluation criteria to ensure that they gain competence in using it.

A completely structured OJT program has some serious drawbacks, too. It is expensive to design and implement, and can run counter to what we know about adult learning. A structured OJT program is still trying to impose the learning process and still trying to teach a mental model rather than guiding the trainees to develop their own mental models. Structured OJT programs decompose complex tasks into the small elements that can more easily be taught, but create the difficulty of re-composing these elements to fit into the real world. Structured OJT programs do best with highly procedural tasks. However, to build a culture of safety, one of the biggest challenges the agencies face is to build expertise at sizing up situations, a skill that is difficult to drill.

A useful approach to developing an OJT program thus is to steer clear of the extremes, and to use a semi-structured approach. The agencies should not leave everything to chance (as in an unstructured approach) or decompose everything into micro-tasks and objectives (as in a highly structured approach). If the agencies want to use OJT to improve safety, the emphasis has to be on the development of expertise, rather than on procedures.

One key area on which to focus OJT is achieving situational awareness. Situational awareness includes the ability to detect when situations have shifted, to anticipate how situations are likely to develop, to make subtle perceptual discriminations, to spot problems very early, and to identify leverage points for overcoming problems. It is crucial to making decisions under time pressure and various degrees of uncertainty.

The aim of OJT is not just to teach crews how to carry out tasks and operate equipment, or teach safe as opposed to unsafe procedures. Rather the training also should enable firefighters to detect when safety margins are being violated. For example, we know that driving trucks over mountain roads at night is risky. We also know that fatigued drivers, who have worked all day, compound the risk. We can issue directives, like “people who are too fatigued should not drive.” However, directives are no substitute for the skills needed to determine that a crew member falls into this category. It takes experience to gauge that a person is too fatigued to be assigned the

task. We can try to substitute artificial metrics (e.g., the amount of hours since the previous rest break), but these are not reliable. The aim of an OJT program should be to develop the perceptual skills to detect when margins of safety are being exceeded.

Therefore, as mentioned before, the OJT approach we recommend is centered around building expertise. We want to develop expertise that provides firefighters with judgment, perceptual skills, and the ability to anticipate and improvise. Firefighters should be able to judge what is typical versus what is an anomaly, perceive subtle discriminations, anticipate how a situation will or can develop, employ tricks of the trade, and improvise on the spot. We see these skills in experienced Incident Commanders, Operations Section Chiefs, Division/Group Supervisors, and Hotshot Crew Superintendents. Some experienced Single Resource Bosses have them, but others are still learning them. Some of the highly trained Type I Squad Bosses and crew members may have these skills. In general, few Type II crew members have these skills, and they may not need to develop them to a high level.

The better fire crews and the levels above them can get at understanding the big picture, the safer fire operations will be. As Crew Supervisors and their crews move up the learning curve and develop expertise more quickly, we expect that they will be making better judgments, and making them more rapidly. By understanding causal dynamics in a wildland firefighting situation, fire personnel will see implications and make preparations in advance, rather than reacting behind the power curve. “Causal dynamics” can include the ability to recognize the limitations of your crew and to recognize that the “edge” for your safety envelop will be different than that of other crews.

Components of OJT

For all of the reasons above, we suggest that the agencies use an expertise-centered approach to teach people how to use OJT. The approach consists of three primary components: climate-setting, assessment/diagnosis, and actual instruction.

Climate-setting for the learning process is important because adults learn best when they are learning what they want to know and helping to direct the process, as partners. Adults learn best when their motivation drives the search and they feel a sense of ownership. Adults learn best when they are not afraid of being criticized or belittled by sarcastic instructors, but are able to admit confusion and ignorance, and to trust the OJT provider with this knowledge. The learner

must trust the OJT provider to admit his or her own ignorance rather than feeling threatened by a tough question.

Some experienced Crew Supervisors are setting the wrong *climate*, one of fear and intimidation, perhaps to ensure that their orders will be obeyed quickly and without question. Some experienced firefighters are too ready to use mockery or ridicule of those just learning their trade. A good OJT program should not undercut the authority of a supervisor. OJT providers must understand how to set a good learning climate without compromising their authority.

Collaborating about goals represents a central aspect of setting a good climate. Adult learners often brush off or resist learning that is pushed or foisted. The goals need to reflect the OJT provider's assessments and the trainee's needs, along with the organization's requirements and timelines. Goal collaboration is a vital part of climate-setting. Thus OJT providers need to be taught how to set the right climate, and how not to destroy it.

Assessment/diagnosis of the trainee is another important component of OJT because a skilled OJT provider is in the best position to gauge a trainee's needs and progress. The wildland fire community depends heavily on the judgment of supervisors when it comes time for giving expanded responsibilities and assignments. The supervisor often decides (assesses) who is ready to handle these new responsibilities and who can think clearly enough to make quick decisions. Assessment is central to providing accurate feedback and helping modify the trainee's goals. Unfortunately, there usually is little preparation to help a supervisor gauge the competence of subordinates. Supervisors too often tend to base their judgments on considerations other than skill level.

Diagnosis also represents a critical instructional function. It is one thing to see someone making a mistake in operating a piece of equipment, such as a chain saw, but another to figure out why the person is making that mistake. If the OJT provider can diagnose the reason for the problem, then it is much easier to train the person to do it the right way.

Instruction is of course the all-important field delivery aspect of OJT. OJT providers need to develop a broad repertoire of *instructional methods*, particularly methods for sharing their own *experience and expertise*. Most training manuals concentrate on instruction suitable to lecture halls and classrooms, but the instructional repertoire needed for OJT is very different. OJT requires techniques for cognitive modeling, ways to assist trainees to build their own mental

models and for finding and using opportunities for active application. OJT includes techniques for providing specific, context-bound observations because generic principles and abstract platitudes are usually too vague to be helpful. OJT includes “thinking out loud” to share the interpretive logic a person uses to make a decision.

While firefighters may argue that the certain generic principles such as “don’t build downhill lines” are valuable, the problem is that this does not help them recognize when they are in an “edge of the envelope” situation, or what could change that could turn the current situation into a dangerous one. Therefore, an effective OJT program includes a sense of when and how to give feedback. Since immediate feedback can get in the way of learning, it is best for trainees to have a chance to obtain their own feedback about the adequacy of their performance, just as they will have to in the field.

Specific Instructional Skills

Research psychologists have identified 57 different instructional strategies or skills that can be used in an OJT environment. The skills are listed in Table B-1, which came from a case study of the use of OJT in a retail company. The table shows the percent of OJT providers who were found to use each of the 57 skills identified; the report from which it came elaborates further.¹

Perhaps the most important of these skills are the ways for a supervisor or experienced crew member to pass on expertise. This involves teaching more than what is available in a training manual, teaching more than basic procedures, and includes the skills of detecting anomalies, recognizing opportunities, anticipating and preventing problems, and compensating for errors. In many cases, this expertise is centered around perceptual skills, which are notoriously difficult to describe. What does an experienced firefighter look for? What questions does he or she ask? The paradox is that the more experienced the OJT providers are, the less able they are to describe what they know and what they can see. Yet, even for these types of skills, methods exist for helping new crew members come up to speed.

¹ “OJT: A Cognitive Model and Prototype Training Program for OJT Providers, U.S. Army Research Institute for the Behavioral and Social Sciences, Alexandria, VA, by Klein Associates, Inc., under Contract MDA903-93-C-0092, August 9, 1995.

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We recommend that the agencies establish an OJT train-the-trainers program, and then expect supervisors to carry it out. Such a program would augment classroom teaching and simulation with an active focus on using field opportunities to build the skills of personnel at all levels of authority. If safety can be improved through gaining expertise, then an effective OJT program can be a vital means of ensuring that expertise is expanded where it counts: in the field.

An Example of Expertise-Centered OJT

As noted in Chapter 5, we are confident in suggesting an OJT program with the above skills and components because one has already been initiated within a firefighting organization, and such programs have also been proven in the military. The Los Angeles County Fire Department is in the process of institutionalizing an OJT program for its captains. Several years ago, LACFD determined that there was a disconnect in its organizational guidelines. The captain at each fire station was given the responsibility of ensuring training, but was not given the training or guidance to achieve this objective. As a result, training was restricted to pre-packaged programs developed by a central training department and promulgated throughout the department, mainly by battalion training officers.

To remedy this problem, the LA County Fire Department commissioned a trial program to teach battalion training officers about OJT, and then extended it to all captains. Rather than rely on a one-shot workshop (the easiest way to generate quick enthusiasm, but usually the worst way to ensure continuity), a three-phase package was used. The department first gave the battalion training officers a four-hour workshop on the basics of OJT, including a homework assignment to identify OJT needs and opportunities in their districts. These workshops were conducted for groups of 8-12 trainers. The second set of workshops, held a month later, reviewed the homework, and focused on methods for handling needs and opportunities. The third set of workshops, held a month after the second, reviewed progress in using the methods, was a refresher and brush-up session, and compared lessons learned.

The reaction to this program was highly positive. The recommendation of the Department leadership was that all captains be given this program, and that in the future *new captains be required to gain proficiency in OJT skills prior to being promoted*. The rationale was that without adequate OJT skills, a firefighter could not be an effective captain. Another recommendation was to provide the OJT training to battalion chiefs.

Some unexpected positive consequences also arose as this program developed. In one session, a captain asked if the OJT program could help with motivational problems. The answer was that it could not; OJT was about training, not about poor attitudes. However, in a subsequent workshop session, the captain informed the group that this answer was wrong. He described an incident where he had been frustrated by a firefighter with a very poor attitude. After learning about OJT, the captain realized that he wasn't getting anywhere chewing this firefighter out after every mistake, and complaining loudly about repeated mistakes. Instead, he used the mistakes as an opportunity to talk about what the firefighter was having trouble understanding, and to ask the firefighter how to practice or prepare better. By shifting the climate from one of confrontation to one of learning, the antagonism seemed to dissipate. The "motivational" problem of the firefighter had turned out to be caused by the poor climate that the captain had been creating in providing feedback.

Currently, the Los Angeles County Fire Department has taken the OJT training over from the developers and is putting on its own workshops. The Department has modified the content to better fit its needs, and plans are being made to ensure that in the future, all captains become skilled in providing OJT.

The OJT skills used in L.A. County were first developed by Klein & Associates for the U.S. Army, and more recently are being taught to the U.S. Marines.

Strategy to Establish OJT

To establish an OJT program for the Federal wildland fire community would take several steps:

- Establishing target groups for the program
- Developing the instructional framework and materials
- Designing assessment procedures
- Securing organizational support

Targeting – The groups to target for OJT were discussed in the text under Goal 71. The strategy outlined below focuses on the fireline-rated positions recommended as highest priority. However, much of the OJT of firefighters will occur away from the fireline environment, often during “project work” assignments or routine job duties. Consequently, the agencies should also

target OJT providers by administrative function (team leader, suppression specialist, Assistant FMO, etc.).

Instructional Framework – There are several alternatives for teaching OJT methods. A starting point can be an initial, four-hour course describing the principles of effective OJT, making use of videotaped lectures to cut down on instructor costs and travel expenses. It would be necessary to augment the videotapes with practice applications so that the Crew Supervisors and others have a chance to experience how it feels to give and receive effective and ineffective OJT. The initial sessions would be followed by group sessions to discuss progress, add additional strategies to the instructional repertoires, and trade lessons learned. This is followed by a third workshop, another group session, similar to the second, and answering questions before sending the new OJT disciples out to do training.

The instructional framework for OJT requires direct interaction and practice. The courses are most effective when taught to groups of 8-12 people at a time. An initial pilot program for 6-12 months could be evaluated and then followed by a phase of institutionalizing the program in the field.

To implement the above approach, an OJT training cadre could be established by selecting 3-4 Division Supervisors in each region, providing them with the OJT training, and relying on them to train Crew Supervisors. We have found it possible to present two 4-hour workshops a day to about 10 people in each workshop. In a week, 10 workshops could be presented, covering 100 Crew Supervisors. The agencies could train 100 Crew Supervisors each week, or 400 per month. Once the initial workshops were completed and a cadre developed, the agencies would run the follow-up workshops, followed by a final workshop in the three-workshop series. Under this scenario, the agencies could train 400 Crew Supervisors in a three-month period, using a cadre of 3-4 instructors per region.

Some or all of this initial training could be done by a specialist contractor if the expertise does not exist in-house. Once the program was established, the agencies could efficiently and economically maintain the program and provide training to new Division/Group Supervisors and Crew Supervisors in the field, using the principles of OJT. In that way the OJT program becomes self-sustaining, and the agencies do not have to endlessly repeat the initial investment.

A second alternative training approach is to present OJT training as part of the Crew Supervisors training curriculum. The agencies might find this alternative more efficient but it would require revision of the Crew Supervisors training curriculum.

Our experience is that the agencies would find the first alternative simpler – setting up a program for Division/Group Supervisors. Because of their experience, Division/Group Supervisors would tend to be more sophisticated about training, so the agencies will find the OJT training easier to present. The training of Division Supervisors might even be achievable in two sessions rather than three. The agencies could employ the same videotaped lectures for both Division and Crew Supervisors, but with different training scenarios. The Division Supervisors scenarios/interventions would focus on helping Crew Supervisors. The training for Crew Supervisors would require scenarios focusing on the safety issues of Squad Leaders and firefighters.

The OJT program for crew members and other firefighters (the third tier to train after Division and Crew Supervisors) would be the simplest of all, because they only need a brief lecture, that could be videotaped, on how to learn in a wildland firefighting OJT environment: how to ask questions, when to ask questions, when NOT to ask questions, and so forth. The agencies could supplement the brief lecture with scripted training scenarios.

Designing Assessment Procedures –Assessment procedures are a critical step in an OJT program. The agencies must prepare to assess how a person such as an individual Crew Supervisor is actually conducting OJT. The agencies will have to design assessment procedures that enable Division Supervisors to determine whether a Crew Supervisor is making effective use of OJT techniques, is skilled at transmitting his/her own expertise to others, is helping the senior crew members to explain things to the new members, and is establishing a climate that fosters learning rather than a climate of intimidation that discourages learning. The Operations Section Chief will need to assess the ability of Division Supervisors to achieve the same outcomes among the Crew Supervisors. Without a systematic effort to conduct assessments, the OJT program will gradually diminish and disappear, and the initial investment will be lost.

Securing Organizational Support – Too often, programs are initiated with high levels of enthusiasm and expectation, as if good ideas by themselves will prevail. However, the reality of organizational dynamics is that organizations and the people in them require incentives and attention to maintain momentum. It will take the agencies 5-10 years to fully institutionalize a wide-scale program like an OJT training framework. “Fully institutionalized” means that a new

generation of Crew Supervisors will be inducted into an organization that relies on OJT and expects each Crew Supervisor to competently provide OJT to the people in his or her care.

The agencies must certify Squad Leaders, Single Resource Bosses, and Division Supervisors as being competent to provide OJT, and make promotion contingent on demonstration of such competence. This represents a critical organizational support element for a successful OJT program. This may sound onerous, but the alternative (accepting people in positions of responsibility who are unable to facilitate learning about issues related to safety) seems far less acceptable. The agencies expect that Crew and Division Supervisors are able to provide effective leadership that will keep people safe. The ability to effectively train and coach people represents a critical element of that capacity to lead. Along with the agencies' expectations comes the responsibility to ensure that fireline supervisors have the skills necessary to carry out their responsibilities.

However, it would be unreasonable to impose a requirement for OJT certification before providing ample opportunities to receive the training and practice OJT skills. Therefore, the agencies should establish an OJT program on an informal basis first, followed several years later by certification requirements. The agencies should provide their personnel with adequate warning and announcements about the OJT program so that no one is surprised or disadvantaged.

Conclusion

OJT is cheaper and more effective than classroom training. Once supervisors are trained in how to improve their use of OJT, it is taught "for free," as a routine thing done in the field. Once established, the OJT program also can serve as a platform for various types of field training in the future. It can be a "force multiplier" for the Federal wildland fire community.

The concept of an institutionalized OJT program seems like a major step, and it is. However, the Federal wildland fire community is unlikely to make large gains in safety and in building expertise without taking major steps. The logistics and impact of an OJT program are probably more economical than the investments required by multimedia training. Multimedia training systems are very expensive to develop and are inherently limited in the types of issues that can be addressed. They also raise questions about generalization to the field. In contrast, OJT is inherently flexible, is intended for the field (so issues of generalization do not apply) and is consistent with principles of active learning, as opposed to the typically passive use of media.

In addition, an OJT program offers the potential for financial savings by reducing the need to provide certain types of training in classroom situations (with their attendant costs). An effective OJT program also will yield a variety of secondary benefits, not the least of which is sending a message that the agencies expect their personnel to achieve high levels of competence, and indirectly, that something new has been introduced to the culture to make it safer.